

I claim:

1. A method for controlling a shift procedure for a marine propulsion system, comprising the steps of:

5       providing a shaft incorporated as part of a shifting apparatus of said marine propulsion system;

          sensing a change of the magnetic characteristic of said shaft in response to a force exerted on said shaft; and

          determining the occurrence of a gear shift operation as a function of said  
10   change of the magnetic characteristic of said shaft.

2. The method of claim 1, wherein:

          said force results in a torque exerted on said shaft.

15   3. The method of claim 2, wherein:

          said magnetic characteristic changes as a function of said torque.

4. The method of claim 1, wherein:

          said shaft is rotatable about a central axis.

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5. The method of claim 1, further comprising:

          affecting the operation of an engine based on said change of said magnetic characteristic of said shaft.

25   6. The method of claim 1, further comprising:

          providing a magnetoelastic sensor associated with said shaft to perform said sensing step.

7. The method of claim 6, wherein:

said magnetoelastic sensor is attached to said shaft.

5 8. The method of claim 6, wherein:

said magnetoelastic sensor is attached to a stationary portion of said marine propulsion system proximate to and disconnected from said shaft.

9. The method of claim 1, further comprising:

10 providing a microprocessor.

10. The method of claim 9, further comprising:

providing a signal to said microprocessor which is representative of said change in the magnetic characteristic of said shaft.

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11. The method of claim 10, further comprising:

providing a signal from said microprocessor to said engine to affect an operation of said engine in response to said change in the magnetic characteristic of said shaft.

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12. The method of claim 1, wherein:

said shaft is a shift shaft.

13. The method of claim 1, further comprising:

25 determining the initiation of a shifting operation as a function of said change of the magnetic characteristic of said shaft.

14. Apparatus for controlling a shift procedure for a marine propulsion system, comprising:

means for providing a shaft incorporated as part of a shifting apparatus of said marine propulsion system;

5 means for sensing a change of the magnetic characteristic of said shaft in response to a force exerted on said shaft; and

means for determining the occurrence of a gear shift operation as a function of said change of the magnetic characteristic of said shaft.

10 15. The apparatus of claim 14, further comprising:

means for affecting the operation of an engine based on said change of said magnetic characteristic of said shaft.

16. The apparatus of claim 15, further comprising:

15 means for providing a magnetoelastic sensor associated with said shaft to perform said sensing step.

17. The apparatus of claim 16, further comprising:

means for providing a microprocessor.

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18. The apparatus of claim 17, further comprising:

means for providing a signal to said microprocessor which is representative of said change in the magnetic characteristic of said shaft.

25 19. The apparatus of claim 18, further comprising:

means for providing a signal from said microprocessor to said engine to affect an operation of said engine in response to said change in the magnetic characteristic of said shaft.

5 20. The apparatus of claim 19, further comprising:

means for determining the initiation of a shifting operation as a function of said change of the magnetic characteristic of said shaft.

21. An apparatus for controlling a shift procedure for a marine propulsion system,  
10 comprising:

a shift shaft incorporated as part of a shifting apparatus of said marine propulsion system; and

a sensor configured to sense a change of the magnetic characteristic of said shift shaft in response to a force exerted on said shift shaft, said sensor providing  
15 an output signal representative of said change of the magnetic characteristic of said shift shaft.

22. The apparatus of claim 21, wherein:

said force results in a torque exerted on said shift shaft, said magnetic  
20 characteristic changing as a function of said torque.

23. The apparatus of claim 22, further comprising:

a microprocessor connected in signal communication with said sensor, said microprocessor providing an output signal which is connected to an engine to  
25 affect the operation of said engine based on said change of said magnetic characteristic of said shift shaft.

24. The apparatus of claim 23, wherein:

said sensor is a magnetoelastic sensor associated with said shift shaft.

25. The apparatus of claim 24, wherein:

5        said magnetoelastic sensor is attached to said shift shaft.

26. The apparatus of claim 24, wherein:

said magnetoelastic sensor is attached to a stationary portion of said marine propulsion system proximate to and disconnected from said shift shaft.

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